

paragraph is new, and the third paragraph makes minor changes in the former first paragraph of the Detailed Description. A marked up copy illustrating the changes is attached hereto.

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Generally, an integrated circuit (IC) package encapsulates an IC chip, or die, in a protective casing and also provides power and signal distribution between the IC chip and an external printed circuit board (PCB). A metal lead frame can be used to provide the electrical paths for that distribution. A lead frame panel suitable for use in accordance with the present invention is illustrated in Fig. 1a. For production purposes, a lead frame panel 110 made up of multiple lead frames 120 is etched or stamped from a thin sheet of metal, as shown in Fig. 1a. An IC chip 130 is then mounted and wire bonded to each lead frame 120, as shown in Fig. 1b. Wire bonding is typically performed using fine gold wires 140. As illustrated in Fig. 1c, each IC chip 130 is then encapsulated in a protective casing 160 which may be formed by dispensing and molding a layer of encapsulant material over all IC chips 130. Next lead frames 120 are cut apart, or singulated to produce individual IC packages 190.

Referring again to Fig. 1a, panel 110 includes a two dimensional array of device areas. Each device area has a plurality of contacts 112 and a die attach pad 114. The panel has a grid of tie bars 115 that extend in perpendicular rows and columns to define the device area. The tie bars 115 carry the contacts 112 and die attach pads 114.

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The embodiment shown in Fig. 2a employs a rigid supporting fixture during the manufacturing process to enable the use of lead frames in chip scale IC packages. An embodiment of a support fixture 200 includes a rigid frame 210 and an adhesive pad 220, as shown in the exploded isometric diagram of Fig. 2a. Because pad 220 is affixed along its border to frame 210, it maintains sufficient tension to provide a stable supporting surface for a lead frame panel 110. By making pad 220 out of a thin, flexible, and electrically non-conductive material, it provides a support structure that will not interfere with the conventional manufacturing processes used in IC package assembly. The size of the interior opening of frame 210 is large enough to allow lead frame panel 110 to be fully supported by pad 220. Multiple IC chips 130 are then installed and wire bonded on lead frame panel 110, as shown in Fig. 2b. Subsequent encapsulation of IC chips 130 in protective casings proceeds as in conventional lead frame processing. If a molded protective casing is to be applied, an encapsulant dam 240 can be constructed around the perimeter of lead frame panel 110. Dam 240 can be made of any substantially rigid substance, including premolded plastic, epoxy, or tape, and serves to prevent flow of encapsulant material beyond the boundaries of lead frame panel 110. Alternatively, containing measures for encapsulant material could be incorporated into the dispensing mechanism. Once encapsulation is complete, support fixture 200 can be removed, either before or after singulation.

In the Claims:

All pending claims have been reproduced below for the convenience of the Examiner. Claims which have been changed by this amendment are indicated with "(Once Amended)".